IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	)	
	)	
Andreas Johannes Gerrits et al.	)	
	)	
Serial No.: 10/539,318	)	Group Art Unit: 2626
	)	
Filed: June 15, 2005	)	Examiner: Douglas Godbold
	)	
For: SINUSOID SELECTION IN AUDIO ENCODING	)	**Board of Patent Appeals and Interferences**
	)	
Confirmation No.: 2734	)	

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REPLY BRIEF UNDER 37 C.F.R. § 41.41

In response to the Examiner's Answer mailed on February 15, 2011 to the Appeal Brief filed on November 23, 2010, and pursuant to 37 C.F.R. § 41.41, Appellants present this Reply Brief in the above-captioned application.

This is an appeal to the Board of Patent Appeals and Interferences from the Examiner's rejection of claims 1-10 in the Final Office Action dated August 3, 2010. The appealed claims are set forth in the attached Claims Appendix.

1. Status of the Claims

Claims 1-10 have been rejected in the Final Office Action. The final rejection of claims 1-10 is being appealed.

2. Grounds of Rejection to be Reviewed on Appeal

I. Whether claims 1-10 are fail to comply with the written description requirement under 35 U.S.C. § 112, first paragraph.

II. Whether claims 1-5, 8, and 10 are anticipated under 35 U.S.C. § 102(b) by U.S. Patent No. 5,717,821 to Tsutsui (hereinafter "Tsutsui2").

III. Whether claims 6, 7, and 9 are unpatentable under 35 U.S.C. § 103(a) over Tsutsui2 in view of U.S. Patent No. 5,054,072 to McAulay et al. (hereinafter "McAulay").

3. Argument

I. The Rejection of Claims 1-10 Under 35 U.S.C. § 112, First Paragraph, Should Be Reversed.

A. The Examiner's Rejection

In the Final Office Action, the Examiner rejected claims 1-10 under 35 U.S.C. § 112, first paragraph, for failing to comply with the written description requirement. (*See* 8/3/10 Office Action, pp. 2-4).

The Examiner states that the recitation in claims 1, 8, and 10 of "*without regard to the at least one of the candidate sinusoids within said local frequency band that is excluded*," is not supported by the specification. The Examiner repeats this contention in the Examiner's Answer and states that "although there is an exclusion of the sinusoid in the denominator of the ratio, the sinusoid still appears in the numerator." (*See* 2/15/111 Examiner's Answer, p. 11).

B. The Specification Provides Supports "Without Regard To The At Least One Of The Candidate Sinusoids Within Said Local Frequency Band That Is Excluded, As Recited In Claims 1.

In the Final Office Action, the Examiner refers to page 3, lines 17-26 of the originally filed specification and states that the combination of sinusoids that excludes the candidate sinusoid "is compared with the amplitude of the candidate sinusoid in order to make a selection. Thus, the selection is made *with* regard to the candidate sinusoid." (*See* 8/3/10 Office Action, p. 2). It seems the Examiner has not properly understood the present disclosure. The cited portion of the originally filed application discloses "thresholding a ratio of a difference between said candidate sinusoid's amplitude and *a weighted mean amplitude of frequency components within said candidate sinusoid's local frequency band from which at least one of the candidate sinusoids within said local frequency band is excluded*." (*See Specification*, p. 3, ll. 18-21) (emphasis added).

This thresholding is explained in more detail at page 7, line 8 – page 8, line 20 of the originally filed specification. According to this portion of the specification, in the numerator of the ratio, the mean amplitude $(\overline{m}_i)$ of the frequency band is subtracted from the candidate sinusoid (A_i) being considered $(A_i - \overline{m}_i)$. (*Id.* at p. 8, ll. 9-12). The denominator consists of the standard deviation (σ_i) of the candidate sinusoid's frequency band. (*Id.*). The mean amplitude $(\overline{m}_i)$ and the standard deviation (σ_i) include weighting factors $W_1(k)$ and $W_2(k)$, respectively, both of which are "decreasing for an index k closer to one of the boundary frequency indices i_a or i_b, in order to reduce boundary effects." (*Id.* at p. 7, ll. 14-16, p. 8, ll. 6-8). So, both the mean amplitude $(\overline{m}_i)$ and the standard deviation (σ_i) eliminate sinusoids at or near the boundary frequency indices i_a and i_b. These sinusoids are eliminated in the numerator and in the denominator of the ratio r_i of equation 8. Therefore, selection is made without regard to at least one candidate sinusoid.

This example in the originally filed specification provides sufficient support for the claim recitation of "*without regard to the at least one of the candidate*

sinusoids within said local frequency band that is excluded." Accordingly, Appellants respectfully request the withdrawal of the 35 U.S.C. § 112, first paragraph, rejection of claims 1-10.

II. The Rejection of Claims 1-5, 8, and 10 Under 35 U.S.C. § 102(b) as Anticipated By Tsutsui2 Should Be Reversed.

A. The Examiner's Rejection

In the Final Office Action, the Examiner rejected claims 1-5, 8, and 10 under 35 U.S.C. § 102(b) as anticipated by Tsutsui2. (*See 8/3/10 Office Action*, pp. 4-8).

The Examiner states that the recitation in claims 1, 8, and 10 of "*without regard to the at least one of the candidate sinusoids within said local frequency band that is excluded*," is not supported by the specification and that the specification discloses that the selection of the selected sinusoid includes that amplitude of the candidate sinusoid. (*Id.* at p. 3). The Examiner relies on this latter interpretation of the present invention and states "Tsutsui2 still teaches the limitations." (*Id.*).

B. Tsutsui2 Does Not Disclose Or Suggest Selecting, By The Computer, Said Candidate Sinusoid As A Selected Sinusoid In Dependence Of The Combination Of Amplitudes Without Regard To The At Least One Of The Candidate Sinusoids Within Said Local Frequency Band That Is Excluded.

Claim 1 recites, "[a] method of encoding an audio signal by representing at least part of said audio signal by a plurality of sinusoids, the method comprising the steps of: performing, by a computer, an analysis of a first segment of said audio signal; selecting, by the computer, candidate sinusoids based on said analysis; defining, by the computer, for at least one of the candidate sinusoids a local frequency band around a frequency of said at least one candidate sinusoid; combining, by the computer, amplitudes of frequency components within said local frequency band form which at least one of the candidate sinusoids within said local frequency band is excluded; and selecting, by the computer, said candidate sinusoid as a selected sinusoid in dependence

of the combination of amplitudes *without regard to the at least one of the candidate sinusoids within said local frequency band that is excluded*."

The Examiner refers to steps S8 and S9 of Tsutsui2's method. However, Appellants respectfully submit that Tsutsui2 utilizes the entire ratio X/Y in step S8, where variable Y **includes the candidate sinusoid**. Tsutsui2 discloses that the variable X represents the "sum of energies of spectrum components adjoining to corresponding spectrum in both directions" and Y represents the "energy value within a predetermined band including the maximum absolute value spectrum and the neighboring spectrums." (*See Tsutsui2*, col. 13, ll. 3-10). However, Tsutsui2 fails to disclose or suggest excluding any sinusoids within the predetermined band.

The Examiner recognizes that the variable X represents "the surrounding bands with the band with the sinusoid excluded." (*See* Examiner's Answer, p. 12). Subsequently, the Examiner concludes that the denominator in Tsutsui2's ratio excludes the candidate sinusoid. (*Id.*). Appellants respectfully submit that the Examiner's interpretation of Tsutsui2 is flawed since variable Y is in the denominator and not variable X. As previously stated, variable Y represents the "energy value within a predetermined band *including the maximum absolute value spectrum and the neighboring spectrums*." (*See Tsutsui2*, col. 13, ll. 3-10) (emphasis added).

Accordingly, Tsutsui2 fails to teach or suggest selecting, by the computer, said candidate sinusoid as a selected sinusoid in dependence of the combination of amplitudes *without regard to the at least one of the candidate sinusoids within said local frequency band that is excluded*, as recited in claim 1. Thus, it is respectfully submitted that claim 1 and its dependent claims 2-5 are allowable over Tsutsui2.

Claims 8 and 10 recite limitations that are substantially similar to those in claim 1. Thus, Appellants respectfully submit that claims 8 and 10 are also allowable over Tsutsui2 for at least the foregoing reasons presented with regards to claim 1.

III. The Rejection of Claims 6, 7, and 9 Under 35 U.S.C. § 103(a) as Unpatentable Over Tsutsui2 in View of McAulay Should Be Reversed.

A. The Examiner's Rejection

In the Final Office Action, the Examiner rejected claims 6, 7, and 9 under 35 U.S.C. § 103(a) as unpatentable over Tsutsui2 in View of McAulay. (*See 8/3/10 Office Action*, pp. 8-11).

B. Tsutsui2 And McAulay Do Not Disclose Or Suggest Selecting, By The Computer, Said Candidate Sinusoid As A Selected Sinusoid In Dependence Of The Combination Of Amplitudes Without Regard To The At Least One Of The Candidate Sinusoids Within Said Local Frequency Band That Is Excluded.

Appellants respectfully submit, and the Examiner correctly acknowledges, that McAulay does not cure the above-described deficiencies of the Tsutsui2 with respect to claims 1 and 8. (*See* Examiner's Answer, p. 12). Because claims 6 and 7 depend on and, therefore, include all the limitations of claim 1, it is respectfully submitted that these claims are also allowable for at least the same reasons given above with respect to claim 1. Because claim 9 depends on and, therefore, includes all the limitations of claim 8, it is respectfully submitted that this claim is also allowable for at least the same reasons above with respect to claim 8.

8. Conclusion

For the reasons set forth above, Appellants respectfully request that the Board reverse the rejection of the claims by the Examiner under 35 U.S.C. §§ 112, 102(b), and 103(a) and indicate that claims 1-10 are allowable.

Respectfully submitted,

Date: April 12, 2011

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CLAIMS APPENDIX

1. (Previously Presented) A method of encoding an audio signal by representing at least part of said audio signal by a plurality of sinusoids, the method comprising the steps of:

performing, by a computer, an analysis on a first segment of said audio signal;

selecting, by the computer, candidate sinusoids based on said analysis;

defining, by the computer, for at least one of the candidate sinusoids a local frequency band around a frequency of said at least one candidate sinusoid;

combining, by the computer, amplitudes of frequency components within said local frequency band from which at least one of the candidate sinusoids within said local frequency band is excluded; and

selecting, by the computer, said candidate sinusoid as a selected sinusoid in dependence on the combination of amplitudes without regard to the at least one of the candidate sinusoids within said local frequency band that is excluded.

2. (Previously Presented) The method as claimed in claim 1, wherein a bandwidth of said local frequency band around the frequency of said at least one candidate sinusoid is defined in dependence on the frequency of said at least one candidate sinusoid.

3. (Previously Presented) The method as claimed in claim 2, wherein said dependence on the frequency of said at least one candidate sinusoid is based on a human's perception of audio.

4. (Previously Presented) The method as claimed in claim 1, wherein said candidate sinusoid is selected as a selected sinusoid when an amplitude of said candidate sinusoid is significant with regard to said combination of amplitudes, said significance being evaluated by thresholding a difference between the amplitude of said candidate sinusoid and a weighted mean amplitude of frequency components within the local frequency band of said candidate sinusoid from which at least one of the candidate sinusoids within said local frequency band is excluded.

5. (Previously Presented) The method as claimed in claim 1, wherein said candidate sinusoid is selected as a selected sinusoid when an amplitude of said candidate sinusoid is significant with regard to said combination of amplitudes, said significance being evaluated by thresholding a ratio of:

a difference between the amplitude of said candidate sinusoid and a weighted mean amplitude of frequency components within the local frequency band of said candidate sinusoid from which at least one of the candidate sinusoids within said local frequency band is excluded; and

a weighted deviation of the amplitudes of frequency components within said local frequency band from which at least one of the candidate sinusoids within said local frequency band is excluded.

6. (Previously Presented) The method as claimed in claim 1, wherein the method further comprises a further selection out of the selected sinusoids which comprises the steps of:

determining for at least one of the selected sinusoids a phase consistency defined by an extent to which a phase of said selected sinusoid at a certain moment in time can be predicted from a phase of said selected sinusoid determined at another moment in time; and

further selecting said selected sinusoid as a further selected sinusoid when its phase consistency is above a predetermined threshold.

7. (Previously Presented) The method as claimed in claim 6, wherein the determination of the phase consistency of said selected sinusoid comprises the steps of:

segmenting a third segment of said audio signal into at least a first and a second part;

determining the actual phases of said selected sinusoid in at least the first and the second part;

using the actual phase in the first part to serve as the input for predicting the actual phase in the second part; and

determining the phase consistency of said selected sinusoid based on a prediction error between the actual phase and the predicted phase in the second part.

8. (Previously Presented) An audio encoder for encoding an audio signal by representing at least part of said audio signal by a plurality of sinusoids, the audio encoder comprising:

means for performing an analysis on a first segment of said audio signal;

means for selecting candidate sinusoids based on said analysis;

means for defining for at least one of the candidate sinusoids a local frequency band around a frequency of said at least one candidate sinusoid;

means for combining amplitudes of frequency components within said local frequency band from which at least one of the candidate sinusoids within said local frequency band is excluded; and

means for selecting said candidate sinusoid as a selected sinusoid in dependence on the combination of amplitudes without regard to the at least one of the candidate sinusoids within said local frequency band that is excluded.

9. (Previously Presented) The audio encoder as claimed in claim 8, wherein the audio encoder is adapted to perform a further selection out of the selected sinusoids, the audio encoder further comprising:

means for determining, for at least one of the selected sinusoids, a phase consistency defined by an extent to which a phase of said selected sinusoid at a certain moment in time can be predicted from a phase of said selected sinusoid determined at another moment in time; and

means for further selecting said selected sinusoid as a further selected sinusoid when the phase consistency of said selected sinusoid is above a predetermined threshold.

10. (Previously Presented) An audio system comprising:

means for obtaining an audio signal;

an audio encoder for encoding said audio signal by representing at least part of said audio signal by a plurality of sinusoids to obtain and encoded audio signal, he audio encoder comprising,

means for performing an analysis on a first segment of said audio signal,

means for selecting candidate sinusoids based on said analysis,

means for defining for at least one of the candidate sinusoids a local frequency band around a frequency of said at least one candidate sinusoid,

means for combining amplitudes of frequency components within said local frequency band from which at least one of the candidate sinusoids within said local frequency band is excluded, and

means for selecting said candidate sinusoid as a selected sinusoid in dependence of the combination of amplitudes without regard to the at least one of the candidate sinusoids within said local frequency band that is excluded; and

a formatting unit for formatting the encoded audio signal into a format suitable for storage and/or transmission.